



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Chung-Chu Chen

Group Art Unit: 2853

Serial No.: 10/057,026

Examiner: Michael S. Brooke

Filed: Jan. 24, 2002

For: Integrated Inkjet Print Head with Rapid Ink
Refill Mechanism and Off-Shooter Heater

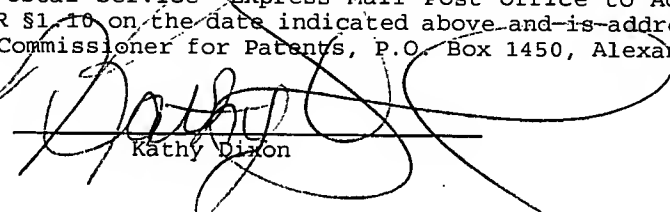
Attorney Docket No.: 64,600-090

#9/ Appeal
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Kathy Dixon

APPEAL BRIEF

Mail Stop: Appeal
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellants appeal in the captioned application from the Examiner's final rejection, dated January 15, 2003, of claims 11-20, under 35 USC §103(a) as being unpatentable over Leban '171, Mitani et al '648, Taub et al '442, Hawkins et al '245 and Moon et al '027.

It is urged that the rejection be reversed and that all the claims be allowed.

(1) REAL PARTY IN INTEREST

The real party in interest in the present appeal is the recorded Assignee of Industrial Technology Research Institute.

(2) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that are known to the Appellant, the Appellant's legal representative, or the assignee.

(3) STATUS OF CLAIMS

Claims 11-20 are pending in the application.

Claims 11-20 stand rejected.

(4) STATUS OF AMENDMENTS

A Request For Reconsideration was filed on or about March 17, 2003.

An Advisory Action was received from the Examiner dated March 26, 2003. No claims were allowed.

A Notice of Appeal was filed on or about April 4, 2003.

(5) SUMMARY OF THE INVENTION

The invention discloses a thermal bubble type inkjet head that is equipped with a rapid ink refill mechanism and off-shooter heater.

(Specification, page 1, lines 5-7)

In a preferred embodiment, a thermal bubble inkjet head is provided which is equipped with a symmetrical heaters and rapid ink refill mechanism which includes a silicon substrate that has a top surface and a bottom surface; a first and a second insulating material layer of at least 1000Å thick on the top and bottom surfaces; a funnel-shaped manifold formed in the second insulating material layer and the silicon substrate; two spaced-apart heaters formed on the first insulating material layer on the top surface; two interconnects formed of a conductive metal each in electrical communication with one of the two spaced-apart heaters; a third insulating material layer on top of the two spaced-apart heaters and the first insulating material layer; a first photoresist layer of at least 2 μm thick on top of the third insulating material layer; a primary and an auxiliary ink chamber formed in the first photoresist layer in fluid communication with each other and with the funnel-shaped manifold; a metal seed layer on top of the first photoresist layer and an inkjet orifice formed in the metal seed

layer; and a Ni layer on top of the metal seed layer with an aperture formed therein in fluid communication with the inkjet orifice.

(Specification, page 7, line 10 through page 8, line 8)

(6) ISSUES

Issue I

Is the rejection of claims 11-12, 14-17 and 20 under 35 USC §103(a) as being unpatentable over Leban '171, Mitani et al '648, Taub et al '442 and Hawkins et al '245 proper when such references do not teach or suggest the specifically claimed limitations in the present application?

Issue II

Is the rejection of claims 13 and 18 under 35 USC §103(a) as being unpatentable over Leban, Mitani et al, Taub et al, Hawkins et al and Moon et al '027 proper when such references do not teach or suggest the specifically claimed limitations of the present application?

(7) GROUPING OF CLAIMS

The rejection of claims 11-12, 14-17 and 20 are contested as a group.

The rejection of claims 13 and 18 are contested as a separate group.

(8) ARGUMENTS

Issue I

Claims 11-12, 14-17 and 20 are rejected under 35 USC §103(a) as being unpatentable over Leban '171 in view of Mitani et al '648, Taub et al '442 and Hawkins et al '245. It is contended that Leban teaches the claimed invention except of a first insulating layer made of silicon dioxide at a thickness of at least 1000 Å, a funnel-shaped manifold in the substrate, a metal seed layer on the first photoresist layer, a nickel layer on top of the metal seed layer, the heater in the primary ink chamber being ring-shaped and the seed layer being either Ni or Cr. It is further contended that Mitani et al teaches the silicon dioxide insulating layer between 10000 and 20000 Å thickness; Taub et al teaches funnel-shaped ink fill slots and Hawkins et al teaches an orifice plate wherein an Ni or Cr seed layer is formed over a substrate and then a plate layer of nickel is deposited over the seed layer.

The rejection of claims 11-12, 14-17 and 20 under 35 USC §103(a) based on Leban, Mitani et al, Taub et al and Hawkins et al is improper and must be reversed.

The present invention, as clearly recited in independent claim 11, recites:

"Claim 11. A thermal bubble inkjet head having off-shooter heaters and a rapid ink refill mechanism comprising:

a silicon substrate ...;

a first insulating material layer of at least 1000 Å thick on said top surface;

a funnel-shaped manifold formed in said ...;

two spaced-apart heaters formed on said first insulating material layer ...;

...;

...;

a first photoresist layer of at least 2000Å thick on top of said third insulating material layer;

a primary and an auxiliary ink chamber formed
in said first photoresist layer in fluid
communication with each other and with said funnel-
shaped manifold;

...."

In the Response to Arguments section of the 1/15/2003 Office Action, the Examiner argued that "Applicant's argument that the funnel-shaped ink fill slots of Taub et al are not in fluid communication with an ink chamber is not persuasive". The Appellants respectfully traverse the Examiner's contention in that the present invention does not merely teach a funnel-shaped manifold in fluid communication with an ink chamber, but instead, teaches and claims:

"A primary and an auxiliary ink chamber ... in
fluid communication with each other and with said
funnel-shaped manifold".

The Appellants respectfully submit that, as admitted by the Examiner that while Leban et al does not teach a manifold at all, and that Taub et al teaches a manifold in fluid communication with a single ink chamber, none of the two references, either singularly or in combination thereof, teaches a funnel-shaped

manifold that is in fluid communication with both a primary and an auxiliary ink chamber.

The Appellants further submit that such characteristic of the present invention is further not taught by Mitani et al and Hawkins et al.

The rejection of claims 11-12, 14-17 and 20 under 35 USC §103(a) based on Leban, Mitani et al, Taub et al and Hawkins et al is improper and must be reversed.

Issue II

Claims 13 and 18 are rejected under 35 USC §103(a) as being unpatentable over Leban, Mitani et al, Taub et al, Hawkins et al and further in view of Moon et al '027. It is further contended that Moon et al teaches a ring-shaped heater that is not taught by the other references.

The Appellants respectfully traverse the rejection of claims 13 and 18 under 35 USC §103(a) based on the four references and Moon et al.

As previously reasoned, the Appellants have shown that the basic structure of independent claim 11 is not taught or disclosed by the four references, either singularly or in combination thereof. Specifically, the existence of **a primary and an auxiliary ink chamber** in a photoresist layer that is in fluid communication with a funnel-shaped manifold. The Appellants therefore respectfully submit that the additional reference of Moon et al does not lend any additional weight in a §103(a) rejection.

The rejection of claims 13 and 18 under 35 USC §103(a) based on Leban, Mitani et al, Taub et al, Hawkins et al and Moon et al is improper and must be reversed.

CLOSING

In summary, the Appellants have shown that their claimed invention is fully supported by a body of evidence of non-obviousness. It is therefore respectfully submitted that such evidence of non-obviousness overcomes any showing of obviousness presented by the Examiner. The Appellants therefore submit that the final rejection of their claims 11-20 is improper under 35 USC §103(a).

U.S.S.N. 10/057,026

The reversal of the final rejection is respectfully
solicited from the Board.

Respectfully submitted,

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CLAIM APPENDIX

11. A thermal bubble inkjet head having off-shooter heaters and a rapid ink refill mechanism comprising:

a silicon substrate having a top surface and a bottom surface;

a first insulating material layer of at least 1000 Å thick on said top surface;

a funnel-shaped manifold formed in said silicon substrate;

two spaced-apart heaters formed on said first insulating material layer on said top surface;

two interconnects formed of a conductive metal each in electrical communication with one of said two spaced-apart heaters;

a third insulating material layer on top of said two spaced-apart heaters and said first insulating material layer;

a first photoresist layer of at least 2000 Å thick on top of said third insulating material layer;

a primary and an auxiliary ink chamber formed in said first photoresist layer in fluid communication with each other and with said funnel-shaped manifold;

a metal seed layer on said first photoresist layer and an inkjet orifice formed in said metal seed layer; and

a Ni layer on top of said metal seed layer with an aperture formed therein in fluid communication with said inkjet orifice.

12. A thermal bubble inkjet head having heaters and a rapid ink refill mechanism according to claim 11, wherein said first photoresist layer preferably has a thickness of at least 5000Å.

13. A thermal bubble inkjet head having symmetrical heaters and a rapid ink refill mechanism according to claim 11, wherein said inkjet orifice is formed in close proximity to said two spaced-apart heaters.

14. A thermal bubble inkjet head having heaters and a rapid ink refill mechanism according to claim 11, wherein said first and second insulating material layers are a SiO₂ layer or a Si₃N₄ layer.

15. A thermal bubble inkjet head having heaters and a rapid ink refill mechanism according to claim 11, wherein said two spaced-apart heaters are formed of TaAl.

16. A thermal bubble inkjet head having heaters and a rapid ink refill mechanism according to claim 11, wherein said metal seed layer is deposited of Cr or Ni.

17. A thermal bubble inkjet head having heaters and a rapid ink refill mechanism according to claim 11, wherein one of said two spaced-apart heaters are positioned in said auxiliary ink chamber.

18. A thermal bubble inkjet head having heaters and a rapid ink refill mechanism according to claim 11, wherein a ring-shaped heater is positioned in said primary ink chamber.

19. A thermal bubble inkjet head having heaters and a rapid ink refill mechanism according to claim 18, wherein said inkjet orifice is formed in said primary ink chamber opposite to said ring-shaped heater.

20. A thermal bubble inkjet head having heaters and a rapid ink refill mechanism according to claim 11, wherein said inkjet head is a monolithic head.